

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1. (currently amended) A method for spotting solution contained in stacked microplates onto slides positioned at a slide positioning station, comprising the steps of:

A) acquiring a high capacity microarrayer for spotting solution onto slides, said high capacity microarrayer comprising:

- 1) a solution removal area,
- 2) a microplate stacking device for stacking microplates,
- 3) a microplate indexing device for sequentially indexing microplates containing solution from said microplate stacking device to said solution removal area and for sequentially indexing said microplates from said solution removal area to said microplate stacking device after at least some of said solution has been removed,

4) a slide positioning station for positioning slides, and

5) a dispense head for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station,

B) removing solution with said dispense head from said solution filled microplate at said solution removal area, and

C) spotting at least one of said slides positioned at said slide positioning station.

~~A high capacity microarrayer for spotting solution onto slides, comprising:~~

~~A) a solution removal area,~~

~~B) a microplate stacking device for stacking microplates,~~

~~C) a microplate indexing device for sequentially indexing microplates containing solution from said microplate stacking device to said solution removal area and for sequentially indexing said microplates from said solution removal area to said microplate stacking device after at least some of said solution has been removed,~~

~~D) a slide positioning station for positioning slides, and~~

E) ~~a dispense head for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station.~~

Claim 2. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 1, wherein said microplate indexing device comprises:

- A) a platform for positioning a plurality of microplates, and
- B) a linear actuator, wherein said platform is mounted to said linear actuator.

Claim 3. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 1, wherein said microplate stacking device comprises:

- A. at least one input stacking chamber for stacking microplates, and
- B. at least one output stacking chamber for stacking microplates.

Claim 4. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 3, wherein said high capacity microarrayer further comprises: further comprising:

- A) an input chamber lifting mechanism for periodically lifting all microplates in said at least one stacking chamber except a bottom microplate, and
- B) an output chamber lifting mechanism for lifting all filled microplates in said at least one output stacking chamber to provide a space for recently depleted microplates to be moved to a bottom position in said at least one stacking chamber.

Claim 5. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 39, wherein said high capacity microarrayer further comprises further comprising a linear actuator, wherein said walking beam indexer is attached to said linear actuator.

Claim 6. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 1, wherein said high capacity microarrayer further comprises: further comprising:

- A. at least one light source capable of illuminating the slides,

- B. at least one camera operating in conjunction with said at least one light source, said at least one camera capable of acquiring and transmitting slide image data,
- C. a computer programmed to:
 - 1) receive said slide image data from said at least one camera,
 - 2) analyze said slide image data, and
 - 3) generate post analysis data based on said analysis of said slide image data, wherein said post analysis data comprises information relating to the success or failure of said microarrayer to successfully spot solution onto the slides, and
- D. an adjustment means for permitting adjustments to be made to said spotting of solution onto the slides wherein said adjustments are made based on said post analysis data.

Claim 7. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein an operator has the option of making adjustments to the spotting process based on the analysis of said slide image data.

Claim 8. (currently amended) The ~~microarrayer~~ method as in Claim 6, further comprising the step of utilizing said computer to automatically making adjustments to said step of spotting at least one of said slides wherein adjustments to the spotting process are automatically made via said computer based on said post analysis data.

Claim 9. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said slide image data comprises information relating to slide alignment.

Claim 10. (currently amended) The ~~microarrayer~~ method as in Claim 9, further comprising the step of utilizing said computer to automatically making adjustments to said step of spotting at least one of said slides wherein said computer makes automatic adjustments to the microarrayer based on said post analysis data.

Claim 11. (currently amended) The microarrayer method as in Claim 6, wherein said slide image data comprises information relating to spot quality.

Claim 12. (currently amended) The microarrayer method as in Claim 11, wherein the post analysis data reports the spot quality as pass or fail.

Claim 13. (currently amended) The microarrayer method as in Claim 12, further comprising the step of reworking ~~wherein the microarrayer operator can rework~~ a failed spot via the microarrayer based on said report of said post analysis data.

Claim 14. (currently amended) The microarrayer method as in Claim 12, further comprising the step of utilizing said computer to ~~wherein said computer~~ automatically rework ~~reworks~~ a failed spot via the microarrayer based on said report of said post analysis data.

Claim 15. (currently amended) The microarrayer method as in Claim 6, wherein said slide image data comprises slide identification information.

Claim 16. (currently amended) The microarrayer method as in Claim 15, wherein said slide identification information is contained in the slide's 2D bar code.

Claim 17. (currently amended) The microarrayer method as in Claim 6, wherein said slide image data comprises:

- A) information relating to slide alignment,
- B) information relating to spot quality, and
- C) slide identification information.

Claim 18. (currently amended) The microarrayer method as in Claim 6, wherein said high capacity microarrayer further comprises ~~further comprising~~ a three axis robotic positioning stage for presentation of the slides and said at least one dispense head.

Claim 19. (currently amended) The microarrayer method as in Claim 18, wherein said three axis robotic positioning stage comprises three linear actuators.

Claim 20. (currently amended) The microarrayer method as in Claim 6, wherein said high capacity microarrayer further comprises further comprising at least one cleaning station, comprising:

- A) a sonic cleaner,
- B) a rinsing fountain, and
- C) a vacuum manifold.

Claim 21. (currently amended) The microarrayer method as in Claim 6, wherein said at least one dispense head is two dispense heads, wherein the first of said two dispense heads is a main dispense head, wherein the second of said two dispense heads is a rework dispense head.

Claim 22. (currently amended) The microarrayer method as in Claim 21, wherein said high capacity microarrayer further comprises further comprising a dispense head assembly, comprising:

- A) a mounting plate attached to the microarrayer via a linear actuator,
 - B) a pneumatic slide mounted to said mounting plate,
- wherein said main dispense head is mounted to said mounting plate and wherein said rework dispense head is mounted to said pneumatic slide enabling said rework dispense head to move above or below said main dispense head.

Claim 23. (currently amended) The microarrayer method as in Claim 6, wherein said camera is a CCD camera comprising a C-mount lens capable of providing the proper field of view and magnification for reading of the slides' 2D bar code and for acquiring said slide image data.

Claim 24. (currently amended) The microarrayer method as in Claim 6, wherein said high capacity microarrayer further comprises further comprising a vibration isolated

base pneumatically isolated from the microarrayer, wherein said vibration isolated base assists in absorbing the shock of external vibrations.

Claim 25. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said computer comprises:

- A) a PC based controller comprising VISUAL BASIC programming, and
- B) a touch screen monitor for user interface.

Claim 26. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said computer is capable of being connected to a computer network for remote monitoring and control.

Claim 27. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein further comprising at least one dispense tip attached to said at least one dispense head.

Claim 28. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said at least one dispense tip is a quill type dispense tip.

Claim 29. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said at least one dispense tip is a piezo type dispense tip.

Claim 30. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said at least one light source is a strobe light.

Claim 31. (currently amended) The ~~microarrayer~~ method as in Claim 6, wherein said at least one light source is a fluorescence device.

Claim 32. (currently amended) A method for spotting solution contained in stacked microplates onto slides positioned at a slide positioning station, comprising the steps of:

A) acquiring a high capacity microarrayer for spotting solution onto slides, said high capacity microarrayer comprising:

1) a solution removal area,

2) a microplate stacking means for stacking microplates,

3) a microplate indexing means for sequentially indexing microplates containing solution from said microplate stacking means to said solution removal area and for sequentially indexing said microplates from said solution removal area to said microplate stacking means after at least some of said solution has been removed,

6) a slide positioning means for positioning slides, and

7) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning means,

B) removing solution with said dispense head means from said solution filled microplate at said solution removal area, and

C) spotting at least one of said slides positioned at said slide positioning means.

A high capacity microarrayer for spotting solution onto slides, comprising:

A) a solution removal area,

B) a microplate stacking means for stacking microplates,

C) a microplate indexing means for sequentially indexing microplates filled with solution from said microplate stacking means to said solution removal area and for sequentially indexing said microplates from said solution removal area to said microplate stacking means after at least some of said solution has been removed,

D) a slide positioning means for positioning slides, and

E) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station.

Claim 33. (currently amended) The high capacity microarrayer method as in Claim 32, wherein said microplate indexing means comprises:

A) a platform means for positioning a plurality of microplates, and

B) a linear actuator means, wherein said platform means is mounted to said linear actuator means.

Claim 34. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 32, wherein said microplate stacking means comprises:

- A. at least one input stacking chamber means for stacking microplates, and
- B. at least one output stacking chamber means for stacking microplates.

Claim 35. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 34, wherein said high capacity microarrayer further comprises: further comprising:

- A) an input chamber lifting means for periodically lifting all microplates in said at least one stacking chamber means except a bottom microplate, and
- B) an output chamber lifting means for lifting all filled microplates in said at least one output stacking chamber means to provide a space for recently depleted microplates to be moved to a bottom position in said at least one stacking chamber means.

Claim 36. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 40, wherein said high capacity microarrayer further comprises further comprising a linear actuator means, wherein said walking beam indexer means is attached to said linear actuator means.

Claim 37. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 32, wherein said high capacity microarrayer further comprises: further comprising:

- A. at least one light source means capable of illuminating the slides,
- B. at least one camera means operating in conjunction with said at least one light source means, said at least one camera means capable of acquiring and transmitting slide image data,
- C. a computer means programmed to:
 - 1) receive said slide image data from said at least one camera means,
 - 2) analyze said slide image data, and

- 3) generate post analysis data based on said analysis of said slide image data, wherein said post analysis data is available for improving the spotting of the solution.

Claim 38. (currently amended) A method for spotting solution contained in stacked microplates onto slides positioned at a slide positioning station, comprising the steps of:

A) acquiring a high capacity microarrayer for spotting solution onto slides, said high capacity microarrayer comprising:

- 1) a solution removal area,
- 2) a slide positioning station for positioning slides,
- 3) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station, and

4) a microplate indexing device for sequentially indexing solution filled microplates to said solution removal area, wherein said microplate indexing device comprises:

- a) at least one input stacking chamber for stacking microplates,
- b) at least one output stacking chamber for stacking microplates,
- c) a walking beam indexer disposed between said at least one input stacking chamber and said at least one output stacking chamber wherein said walking beam indexer is for moving microplates from said at least one input stacking chamber to said at least one output stacking chamber, and

d) a lid lifter for lifting the lid off each microplate to permit the microplate to be accessed by said dispense head for solution removal, and after solution is removed to replace the lid

B) removing solution with said dispense head means from said solution filled microplate at said solution removal area, and

C) spotting at least one of said slides positioned at said slide positioning means.

A high capacity microarrayer for spotting solution onto slides, comprising:

A) a solution removal area,

- ~~B) a slide positioning station for positioning slides,~~
- ~~C) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station, and~~
- ~~D) a microplate indexing device for sequentially indexing solution filled microplates to said solution removal area, wherein said microplate indexing device comprises:~~
 - ~~1. at least one input stacking chamber for stacking microplates,~~
 - ~~2. at least one output stacking chamber for stacking microplates,~~
 - ~~3. a walking beam indexer disposed between said at least one input stacking chamber and said at least one output stacking chamber wherein said walking beam indexer is for moving microplates from said at least one input stacking chamber to said at least one output stacking chamber, and~~
 - ~~4. a lid lifter for lifting the lid off each microplate to permit the microplate to be accessed by said dispense head for solution removal, and after solution is removed to replace the lid.~~

Claim 39. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 3, wherein said microplate indexing device is a walking beam indexer disposed between said at least one input stacking chamber and said at least one output stacking chamber wherein said walking beam indexer is for moving microplates from said at least one input stacking chamber to said at least one output stacking chamber.

Claim 40. (currently amended) The ~~high capacity microarrayer~~ method as in Claim 34, wherein said microplate indexing means is a walking beam indexer means disposed between said at least one input stacking chamber means and said at least one output stacking chamber means wherein said walking beam indexer means is for moving microplates from said at least one input stacking chamber means to said at least one output stacking chamber means.

Claim 41. (currently amended) A method for spotting solution contained in stacked microplates onto slides positioned at a slide positioning station, comprising the steps of:

A) acquiring a high capacity microarrayer for spotting solution onto slides, said high capacity microarrayer comprising:

- 1) a solution removal area,
- 2) a slide positioning means for positioning slides,
- 3) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning means, and

4) a microplate indexing means for sequentially indexing solution filled microplates to said solution removal area, wherein said microplate indexing means comprises:

- a) at least one input stacking chamber means for stacking microplates,
- b) at least one output stacking chamber means for stacking microplates,
- c) a walking beam indexer means disposed between said at least one input stacking chamber means and said at least one output stacking chamber means wherein said walking beam indexer means is for moving microplates from said at least one input stacking chamber means to said at least one output stacking chamber means, and
- d) a lid lifter means for lifting the lid off each microplate to permit the microplate to be accessed by said dispense head means for solution removal, and after solution is removed to replace the lid

B) removing solution with said dispense head means from said solution filled microplate at said solution removal area, and

C) spotting at least one of said slides positioned at said slide positioning means.

~~A high capacity microarrayer for spotting solution onto slides, comprising:~~

~~A) a solution removal area,~~

~~B) a slide positioning means for positioning slides,~~

- ~~C) a dispense head means for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning means, and~~
- ~~D) a microplate indexing means for sequentially indexing solution filled microplates to said solution removal area, wherein said microplate indexing means comprises:~~
 - ~~1. at least one input stacking chamber means for stacking microplates,~~
 - ~~2. at least one output stacking chamber means for stacking microplates,~~
 - ~~3. a walking beam indexer means disposed between said at least one input stacking chamber means and said at least one output stacking chamber means wherein said walking beam indexer means is for moving microplates from said at least one input stacking chamber means to said at least one output stacking chamber means, and~~
 - ~~4. a lid lifter means for lifting the lid off each microplate to permit the microplate to be accessed by said dispense head means for solution removal, and after solution is removed to replace the lid.~~

Claim 42. (new) A high capacity microarrayer for spotting solution onto slides, comprising:

- A) a solution removal area,
- B) a microplate stacking device for stacking microplates,
- C) a microplate indexing device for sequentially indexing microplates containing solution from said microplate stacking device to said solution removal area and for sequentially indexing said microplates from said solution removal area to said microplate stacking device after at least some of said solution has been removed,
- D) a slide positioning station for positioning slides, and
- E) a dispense head for accessing said solution removal area and for removing solution from a solution filled microplate at said solution removal area to spot a slide at said slide positioning station,
- F) at least one light source capable of illuminating the slides,

- G) at least one camera operating in conjunction with said at least one light source, said at least one camera capable of acquiring and transmitting slide image data,
- H) a computer programmed to:
 - 1) receive said slide image data from said at least one camera,
 - 2) analyze said slide image data, and
 - 3) generate post analysis data based on said analysis of said slide image data, wherein said post analysis data comprises information relating to the success or failure of said microarrayer to successfully spot solution onto the slides, and
- I) an adjustment means for permitting adjustments to be made to said spotting of solution onto the slides wherein said adjustments are made based on said post analysis data,
- J) at least one cleaning station, comprising:
 - 1) a sonic cleaner,
 - 2) a rinsing fountain, and
 - 3) a vacuum manifold.